Simplot

AgriBusiness
Don Plant

Interoffice Communication

TO: KIRK ADKINS
FROM: BOB WILLEY
SUBJECT: SULFURIC ACID PRODUCTION – 300 SULFURIC
             DEQ REQUEST FOR ADDITIONAL INFORMATION
DATE: 03/04/2008

In February 2008, Carole Zundel, from the Idaho Department of Environment Quality requested additional information regarding sulfuric acid production at our #300 Sulfuric Acid Plant. Those requests are listed below:

DEQ request No. 1

What are the unit conversion efficiency factors?

J.R. Simplot Company, Don Plant, Response:

The J.R. Simplot Company, Don Plant manufactures two concentrations of sulfuric acid. 93% sulfuric acid is manufactured during the winter months and 98% sulfuric acid is manufactured during the summer months. The following conversion efficiency factors are used:

Conversion Efficiency Factor for 93% Sulfuric Acid   = 0.0069

Conversion Efficiency Factor for 98% Sulfuric Acid   = 0.0073

DEQ Request No. 2

How are the unit conversion efficiency factors determined?

J.R. Simplot Company, Don Plant, Response:

The unit conversion efficiency factors are based on an estimated specific gravity of the sulfuric acid and concentration. During cold weather operation, the sulfuric acid is 93% nominal, and during warm weather months, 98% nominal. The 97% factor compensates for specific gravity variation with temperature and inherent fluctuations within the process. The following equations are used to determine the unit conversion factors:

For 93% Sulfuric Acid volumetric flow to 100% Sulfuric Acid tons

$$\frac{gallons}{} \times \frac{8.34 lbs}{gallon} \times 1.8308 Sp.Gr. \times \frac{1 ton}{2000 lbs} \times 93\% SA \times 97\% = 0.0069$$

Where:

8.34 lbs	= weight of one gallon of water
1.8308 Sp.Gr.	= specific gravity of 93% sulfuric acid
93%SA	= concentration of 93% sulfuric acid, converts to 100% sulfuric acid weight
97%	= conversion factor that compensates for specific gravity variation with temperature and inherent fluctuations within the process

For 98% Sulfuric Acid volumetric flow to 100% Sulfuric Acid tons

$$\frac{gallons}{} \times \frac{8.34 lbs}{gallon} \times 1.8351 Sp.Gr. \times \frac{1 ton}{2000 lbs} \times 98\% SA \times 97\% = 0.0073$$

Where:

8.34 lbs	= weight of one gallon of water
1.8351 Sp.Gr.	= specific gravity of 98% sulfuric acid
98%SA	= concentration of 98% sulfuric acid, converts to 100% sulfuric acid weight
97%	= conversion factor that compensates for specific gravity variation with temperature and inherent fluctuations within the process

DEQ request No. 3

Are the unit conversion factors static numbers or are they also calculated continuously based on other monitored information?

J.R. Simplot Company, Don Plant, Response:

The unit conversion factors are static numbers during the period of operation (warm or cold months). Therefore, during the warm weather months, the calculation for 98% sulfuric acid is used. During the cold weather months, the calculation for 93% sulfuric acid is used.

DEQ request No. 4

What are all calculations and conversions that the data acquisition system uses to get from a measured volumetric flow rate of sulfur or sulfuric acid (in gallons per minute?) to a mass flow rate of tons 100% sulfuric acid per hour?

J.R. Simplot Company, Don Plant, Response:

The data acquisition system uses the following equation to covert gallons per minute to tons per minute. The tons per minute data is integrated over a sixty minute period to obtain tons of 100% sulfuric acid per hour.

Equation for 93% acid – winter month operation

(Product flow in GPM to Storage) + (Acid Flow in GPM to Stripper) * (.0071)*(.97)

Where:

Product flow in GPM to Storage =   Flow meter reading of sulfuric acid shipped to storage

Acid Flow in GPM to Stripper =   Flow meter reading of sulfuric acid shipped to the stripper

$$.0071 = \frac{gallons}{\min ute} \times \frac{8.34 lbs}{gallon} \times 1.8308 Sp.Gr. \times \frac{1 ton}{2000 lbs} \times 93\% SA$$

.97 =   conversion factor that compensates for specific gravity variation with temperature inherent fluctuations within the process

Equation for 98% acid – summer month operation

(Product flow in GPM to Storage) + (Acid Flow in GPM to Stripper) * (.0075)*(.97)

Where:

Product flow in GPM to Storage =   Flow meter reading of sulfuric acid shipped to storage

Acid Flow in GPM to Stripper =   Flow meter reading of sulfuric acid shipped to the stripper

$$.0075 = \frac{gallons}{\min ute} \times \frac{8.34lbs}{gallon} \times 1.8351 Sp.Gr. \times \frac{1ton}{2000lbs} \times 98\% SA$$

.97 =   conversion factor that compensates for specific gravity variation with temperature and inherent fluctuations within the process